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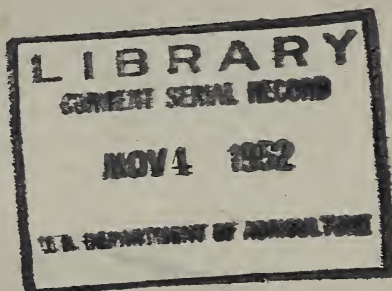


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*Improved Management  
of Irrigated Pastures  
Pays Dividends *over**



UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

PA-205

# IMPROVED MANAGEMENT OF IRRIGATED PASTURES PAYS DIVIDENDS

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Improved, properly managed irrigated pastures are highly profitable. Improvement of pastures is one of many soil and water conservation measures that may be used, where they apply, as part of a complete farm or ranch plan. Such conservation systems permit better use of the land and give a higher production without damage to the soil.

The value of improved and well-managed irrigated pastures has been proved by the Kittitas Soil Conservation District in Washington, where the District Board of Supervisors sponsored a 41-acre demonstration pasture for a 5-year period.<sup>1</sup> Complete records on costs, yields, and returns show that:

1. Properly prepared and managed irrigated pastures produce two to three times as much beef per acre as unimproved pastures. The unimproved pastures were mostly Kentucky bluegrass. The amount of beef produced averaged 200 to 250 pounds per acre. The pasture used in this trial produced an average of 549 pounds of beef per acre.
2. The pasture plants that predominated in the mixture at the end of the trial were the broad-leaved grasses, Manchar smooth brome, Alta fescue, and orchardgrass, and the high-yielding legume, Ladino clover.
3. Yearling steers made an average gain of 2.01 pounds per day during the 5-month pasture season.
4. The pasture cost of producing a pound of beef gain at prevailing prices averaged 7.3 cents. This cost includes the cost for the first pasture season before the plants were fully developed.
5. The average net income per acre from the pasture was \$90.84 per year for four consecutive years.
6. There are ways by which the efficiency could be improved and costs reduced.

Livestock production was one of the major farm enterprises, its growth being limited to availability of range or pasture. Unimproved irrigated pastures of Kentucky bluegrass were producing 200 to 250 pounds of beef per acre during a 5-month grazing season. About 23,000 acres were being used for pasture. These were the findings of a survey of Kittitas

Valley made by the Soil Conservation Service in 1945.

The Kittitas Valley, in south-central Washington, is within the Kittitas Soil Conservation District. The Soil Conservation District Board of Supervisors<sup>2</sup> decided that pasture improvement should be one of the District's major objectives. They believed that the Valley's pasture land,

<sup>1</sup> In private hands in 1951, the pasture produced an average of 507 pounds of beef gain per acre, plus 0.3 ton of hay per acre. No fertilizer was applied in 1951.

<sup>2</sup> The Board of Supervisors was composed of R. L. Rutter, Jr., Chairman; Fred Adams; Henry Schnebly; Melvin Lorfald; and M. C. Knoke.



if properly managed, could give higher production. They wanted to know what the Kittitas Valley farmers could reasonably expect in pounds of beef per acre on good irrigated pasture, and what it would cost to produce it.

Specific answers to these questions were not readily available. The Board decided to sponsor a demonstration pasture. By doing so they felt they would accomplish two objectives: First, get specific answers about the production possibilities of the pasture land of the Valley as a whole; and second, create interest in pasture improvement as a farm practice. A 41-acre tract, representative of much of the pasture land of the Valley, was leased for a 5-year period.

### The Land

The tract leased by the District was surveyed by the Soil Conservation Service and classified as to its land capability. About 27 acres was in land-capability Class II. Half of the remaining 14 acres was Class III land and the other half Class VI. Class II land in the pasture was fairly well drained and suitable for cropping.

The Class III land required intensive drainage. The soil in the Class II and Class III land was loam or sandy loam with the subsoil less permeable than the surface soil and had porous, rapidly permeable sand and gravel at depths of 24 to 36 inches. The Class VI land was even shallower and included bars of coarse, open gravel that were scattered through the tract.

The tract had never been leveled and was too rough for good surface irrigation. Seventeen and one-half acres had been cropped to oats. The remainder was in old bluegrass pasture. About 15 acres of the old pasture was in need of drainage. The entire tract was infested with noxious weeds of various kinds, particularly Canadian thistle and quackgrass.

The land was appraised by the Kittitas Reclamation District at \$81.74 per acre. The Board of Supervisors placed its value at \$100 per acre for the purpose of calculating costs.

### Establishing the Pasture

The Board of Supervisors requested advice from the Soil Conservation Service agronomists, nurserymen,



*Aerial view of a portion of Kittitas Valley, showing the position of the demonstration pasture.*



*Excellent stand of grasses and legumes on Class III and Class VI land.*



*One of the numerous rock bars (Class VI land) before seeding.*



engineers, and soils specialists; the Washington State Agricultural Experiment Station; the Irrigation Experiment Station at Prosser; and the Kittitas County Extension Agent to guide them in outlining plans for the demonstration pasture. After plans were completed the Soil Conservation Service was requested to assist the District in establishing the pasture.

The development work, started in November 1945, included construction of 550 feet of covered drain and 850 feet of open drain and leveling of 30 acres. In the spring of 1946 the tract was worked 7 to 17 times to kill the quackgrass, bluegrass, and Canadian thistles. By the middle of July the quackgrass and most of the bluegrass was killed but some thistles remained.

The pasture was divided by cross fencing into four fields. The acreage of each field and the kind of cover on it when the development work was started in 1945 are shown below:

	<i>Acres</i>
Field 1 (oat stubble).....	8.82
Field 2 (oat stubble).....	8.82
Field 3 (bluegrass sod).....	11.25
Field 4 (bluegrass sod).....	12.12
Total .....	41.01

On August 24, 1946, the pasture was seeded to the following mixture:

	<i>Pounds per acre</i>
Smooth brome (Manchar).....	4
Alta fescue.....	3
Orchardgrass (commercial).....	3
Tall oatgrass (commercial).....	3
Perennial ryegrass.....	1½
Ladino clover.....	1
Alsike clover.....	1
Oats.....	14

The oats were included to help get the light grass seed through the drill and to give the grass seedlings protection from the drying fall winds. The oats winterkilled.

The Soil Conservation Service, as part of its assistance, furnished the seed for the pasture. It also established a small experimental plot on field 3 to test the various grasses.

## Stocking the Pasture

In 1947 the new seedlings were allowed to become established before grazing. The pasture was cut for hay the middle of June and yielded about 1.8 tons per acre. The pasture was first grazed on July 22, 1947, and each year thereafter as shown in table 1.

Table 1.—*Period and length of grazing season*

<i>Year</i>	<i>Period</i>	<i>Length of grazing season</i>
		<i>Days</i>
1947....	July 22–Oct. 17....	87
1948....	Apr. 23–Sept. 24....	154
1949....	Apr. 24–Oct. 3....	162
1950....	Apr. 28–Oct. 31....	178

The number and kind of cattle grazed and the number of pasture days per season are shown in table 2.

In 1947 the 40 yearling steers were



*Excellent grass-legume pasture. Understorey is Ladino clover.*

good-quality stockers. The ten 2-year olds were fair to good. The yearling steers in 1948, 1949, and 1950 were all good-quality stockers.

In 1948 and 1949 the steers were wintered on oats and grass hay and in 1950 on oats, oil cake, and grass hay. In 1948 the steers had shipping fever 3 weeks before going on pasture. They had gained only 62 pounds each between weaning in November and being put on pasture in April. The 1949 steers gained 138 pounds each between weaning and pasture and the 1950 steers 172 pounds.

Each year during the 4-year demonstration the steers were allowed to fill on pasture before the initial weighing. All of the steers were free from disease. There was no death loss.

## Managing the Pasture

The fields received phosphate fertilizer in the form of single superphosphate (18 percent) in the following amounts by years:

	Pounds per acre
1946 (October).....	293
1947 (November).....	1 300
1948.....	0
1949 (March).....	220
1950 (March).....	243

<sup>1</sup> Applied to one-half of each field.

In 1949 pasture growth during the middle of the summer was slower than usual. To test the value of nitrogen in speeding up summer growth, 15 pounds of anhydrous ammonia (12

pounds nitrogen) per acre was applied on August 4 as gas in the irrigation water on fields 1 and 4. A second application of 20 pounds of nitrogen per acre was made on August 28 to the same two fields. In late May and early June 1950 anhydrous ammonia was applied as follows:

	Pounds of nitro- gen per acre
Field 2.....	43
Field 3.....	60
Field 4.....	66

Each field was clipped in early May 1947 to kill annual weeds. Fields 3 and 4 were again clipped in August to control Canadian thistle. All fields were clipped in late May or early June in 1948, 1949, and 1950 to remove older growths of uneaten grass.

Droppings were spread early each spring. It was not necessary to spread droppings during the pasture season.

Irrigation water was applied by the corrugation system—twice in 1946, nine times in 1947, eight times in 1948, nine times in 1949, and seven times in 1950. The rock bars were more difficult to irrigate and required more frequent applications than the rest of the fields.

The pastures were rotationally grazed. The average rotation grazing period was 8.7 days in 1947, 7 days in 1948, 6.8 days in 1949, and 6.4 days in 1950. The cattle were removed in the fall early enough for the pasture to get a good growth of vigorous plants before the winter months.

Table 2.—*Number and kind of cattle and number of pasture days*

Year	Number and kind of cattle	Pasture days per season	Pasture days per acre
		<i>Number</i>	<i>Number</i>
1947.....	{ 40 yearling Hereford steers..... 10 2-year-old Hereford-Shorthorn steers.....	4,350	106
1948.....	70 to 100 yearling Hereford steers.....	12,177	297
1949.....	65 to 100 yearling Hereford steers.....	12,630	308
1950.....	20 to 90 yearling Hereford steers <sup>1</sup> .....	12,730	311

<sup>1</sup> In 1950 the main herd was removed and sold on September 23. 20 yearling steers were then grazed on the pasture from October 1 to 31.



## The Payoff

Accurate records were kept of all phases of operation of the pasture. All items going into pasture development or management, even though donated, were charged at prevailing prices. Costs were separated into three major groups: Capital, fixed charges, and management costs. The capital costs consisted of interest on the land at 5 percent, land-development costs amortized over various periods at 5 percent, and pasture-establishment costs amortized over 7 years at 5 percent. The fixed costs included taxes and cost of irrigation water. Management costs included labor, use of machinery and equipment, fertilizers, and minor repairs. Table 3 shows the annual per-acre costs of the pasture.

The cattle were weighed when placed in the pasture, and again when removed. They were sold as grass-fat steers at prevailing market prices upon removal from the pasture.

The cattle fed on the pasture made an average of 2.01 pounds of gain per day per head and an average of 549 pounds of beef per acre (table 4). The average gross value of the beef produced per acre was \$130.67. The

TABLE 3.—*Annual costs per acre*

Year	Capital	Management	Fixed	Total
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1947.....	16.62	16.65	10.88	44.15
1948.....	16.62	12.01	7.90	36.53
1949.....	16.62	13.99	7.79	38.40
1950.....	16.62	15.72	7.89	40.23
Average....	16.62	14.59	8.62	39.83

pasture cost of producing the 549 pounds of beef averaged \$39.83. This gave an average net pasture income of \$90.84 per acre.

The average pasture cost for producing the beef on the demonstration pasture was 7.3 cents per pound of gain (table 5). The highest cost, 13.1 cents per pound, was in the first production year. The average for the other years was 6.2 cents.

Note that the costs per pound of gain are pasture costs only. They do not include other costs necessary to the livestock enterprise, such as interest on investment in livestock, winter-feeding cost, and shipping cost.

Table 4.—*Annual gains and returns*

Year	Stocking and gains			Costs and returns			
	Steer days per acre	Average daily gain per head	Average seasonal gain per acre	Average selling price of beef per pound	Gross value of beef produced per acre	Gross cost per acre	Net income per acre
	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Cents</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1947 <sup>1</sup> .....	171	1.97	337	23.1	77.85	44.15	33.70
1948.....	297	2.18	647	24	155.28	36.53	118.75
1949.....	308	2.01	619	21	129.99	38.40	91.59
1950.....	311	1.90	591	27	159.57	40.23	119.34
Average.....	273	2.01	549	23.8	130.67	39.83	90.84

<sup>1</sup> The 1.8 tons of hay produced in 1947 was converted to equivalent beef production on the basis of 28 pounds of grass-legume hay to give 1 pound of gain.

Table 5.—*Cost per pound of gain*

Year	Average gain per acre	Per-acre cost of pasture	Pasture cost per pound of gain
	<i>Pounds</i>	<i>Dollars</i>	<i>Cents</i>
1947.....	337	44.15	13.1
1948.....	647	36.53	5.6
1949.....	619	38.40	6.2
1950.....	591	40.23	6.8
Average....	549	39.83	7.3

An evaluation of the results pertaining to the demonstration pasture suggests that:

1. The cost of land development and pasture establishment was unnecessarily high. The average farm operator could lower these costs 25 to 30 percent by proper planning.
2. The pasture seed mixture can be simplified and made less costly, because only four of the original species remained at the end of the fourth grazing season.
3. The fertilizer program was experimental in nature, and the results were not conclusive. Indications were that yields and quality

could be influenced materially by the kind of fertilizer applied and the timeliness of application.

4. Better balancing of pasture stocking would have increased the per-acre gains. The pastures were understocked during the lush spring period and were probably slightly overstocked during the middle of the summer.
5. More efficient use of irrigation water would eliminate overuse and lower costs.
6. Improved management of pastures is extremely effective in controlling or eradicating noxious weeds.

The report has a significance far beyond the cataloging of results from grazing cattle on a 41-acre demonstration pasture. In the last 3 years Kittitas Valley farmers have seeded about 10,000 acres to improved pasture mixtures. The demonstration pasture has created widespread interest in soil conservation district activities, not only among farmers but among townspeople as well. Its establishment has resulted in a keen interest of the District supervisors in all phases of District activities. The results, while applying directly to the Kittitas Valley, indicate what improved management of irrigated pastures will do wherever it is practiced.



*Irrigation water being applied between grazing periods.*